

Calculus

Name _____

An object moves along a line so that its position at time t is given by $s(t) = t^3 - 5t^2 + 3t + 2$ where $t \geq 0$.

- a. What is the object's position at time $t = 2$?

$$8 - 20 + 6 + 2$$

$$-4$$

- b. What is the object's velocity at time $t = 2$?

$$v(t) = 3t^2 - 10t + 3$$

$$v(2) = -5$$

- c. What is the object's acceleration at time $t = 2$?

$$a(t) = 6t - 10$$

$$a(2) = 2$$

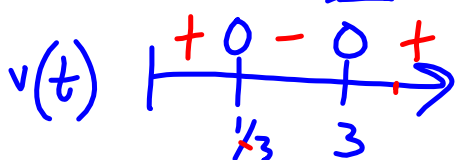
- d. Is the object speeding up or slowing down at $t = 2$? Justify your response.

Slowing down b/c Velocity and acceleration have diff. signs

- e. When is the object at rest?

$$t = 3 \quad t = \frac{1}{3}$$

- f. When is the object moving right?



$$\left[0, \frac{1}{3}\right) \cup (3, \infty)$$

- g. How far does the object travel in the first 4 seconds?

$$\left|s(0) - s\left(\frac{1}{3}\right)\right| + \left|s\left(\frac{1}{3}\right) - s(3)\right| + \left|s(3) - s(4)\right|$$

$$\left|2 - \frac{67}{27}\right| + \left|\frac{67}{27} - (-7)\right| + \left|(-7) - (-2)\right|$$

$$\frac{404}{27}$$

$$e) v(t) = 3t^2 - 10t + 3$$

$$0 = \textcircled{3}t^2 - 10t \textcircled{+3}$$

$\downarrow \quad \quad \quad \downarrow$

$$\underline{3t^2 - 9t} \quad \underline{-1t + 3}$$

$$ac = 9$$
$$b = -10$$

$$3t(t-3) - 1(t-3)$$

$$(t-3)(3t-1)$$

$$t=3 \quad t=\frac{1}{3}$$